

**Official Amendment**  
Serial No. – 10/625,886  
Docket No. – UVD 0299 IA / UD 268

**REMARKS**

Claims 1-166 were pending in the present application. Claims 1, 6, and 137 have been amended. As support for these amendments is provided for by the specification, no new matter has been entered. Claims 12-34, 39, 40, 48-50, 56-136, 138, and 139 were withdrawn from consideration. As a result of this amendment, claims 1-11, 35-38, 41-47, 51-55, and 137 are pending. Reexamination and reconsideration are requested in light of the accompanying amendments and remarks.

The rejection of claims 1, 4-11, 35-38, 51-53, 55, and 137 under 33 U.S.C. § 102(b) as being anticipated by PCT publication WO 98/48075 (treated as equivalent to U.S. Patent No. 6,200,672 to Tadokoro) has been overcome. Tadokoro teaches “a surface treated metal sheet which is coated with a layer comprising as main components, *a complex and/or salt* between *a rare earth metal element and an organic compound* having in the molecule one or more functional groups selected from among -O-, =O, -OH, -COOH, -NH<sub>2</sub>, -NH, =N-, -SH, -SO<sub>3</sub>H and phosphoric groups, and *a matrix which physically holds the above and has adhesive power for metal sheets*, as well as a metal surface treatment solution used therefore.” Abstract.

According to the examiner, “Tadokoro teaches an aqueous metal surface treatment fluid comprising a rare earth element such as tetravalent cerium (col. 5 lines 6-9) and oxyacid anions such as phosphate, tungstate, vanadate anions, wherein the rare earth metal elements and the oxyacid anions form oxyacid compounds (col. 9 lines 28-33).” However, col. 5, lines 6-9, and col. 9, lines 28-33 refer to different components of the coating. One component is a *complex and/or salt* between a rare earth element and an organic compound having certain functional groups (rare earth metal complex). The second component is a *matrix* capable of holding the rare earth metal complex and having adhesive power for metal sheets. See Abstract, col. 3, lines 12-20 and 61-67, col. 13, lines 43-55, and Tables 1 and 2. The discussion at col. 5, lines 6-9 refers to the first component, the rare earth metal complex. See col. 4, line 52 to col. 5, line 35, and col. 10, line 64 to col. 11, line 48. The discussion at col. 9, lines 28-33 refers to the second

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component, the matrix. See col. 7, lines 46-60, col. 9, lines 26-43, col. 10, lines 4-8, col. 12, line 43 to col. 13, line 42.

The examiner also stated that "Tadokoro further teaches a rare earth metal complex comprising rare earth elements such as tetravalent cerium and an inorganic compounds [sic] such as phosphates, nitrates and sulfates (col. 5 lines 27-31)." However, col. 5, lines 27-31 does not refer to a complex between a rare earth metal and an inorganic compound. As explained at col. 5, lines 24-27, the rare earth metal complex (i.e., the complex and/or salt between a rare earth element and an *organic* compound) can have an inorganic compound as a ligand. "In the case of a complex, there is no problem if it *also contains an inorganic compound as a ligand in addition to the organic compound.*"

With respect to claims 1 and 9-11, the examiner stated that "the tetravalent cerium of Tadokoro reads on the claimed rare earth element and the phosphate, tungstate, vanadate, sulfate and nitrate of Tadokoro read on the claimed inorganic valence stabilizer. The oxyacid compound or the rare earth metal complex of Tadokoro reads on the rare earth/valence stabilizer complex." However, Tadokoro does not teach a seal, as claimed. Metals and metal alloys can have coatings such as anodized coatings, phosphate coatings, or black oxide coatings, applied to their surface for corrosion protection. These coating frequently exhibit flaws, such as pores, pinholes or thin portions in the coating after formation and do not contain any inherent means to repair these coating breaches. The application of a second solution is necessary to fill the pores in the coating and deposit compounds that will act as long-term corrosion protective species. The claimed seals are applied to anodized coatings, phosphate coatings, and black oxide coatings. See p. 2, lines 12-29. Tadokoro teaches applying a layer comprising as major components a rare earth metal complex, and a matrix. The matrix physically holds the rare earth metal complex, and has adhesive power for metal sheets. See Abstract, and col. 7, lines 45-49. Some matrix materials are said to control corrosion by their barrier effect, with excess oxyacid forming oxyacid salt layer-type passive layers or oxide layer-type passive layers. See col. 9, lines 34-43. Tadokoro's matrix holds the rare earth metal complex. Tadokoro does not teach

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applying its coating over anodized coatings, phosphate coatings, or black oxide coatings. It is simply a layer deposited on the metal surface, not a post-treatment applied over anodized coatings, phosphate coatings, or black oxide coatings. Thus, it is not a seal, as claimed.

With respect to claim 6, the examiner states that “Tadokoro teaches the claimed phosphate compound ad [sic] claimed.” However, Tadokoro does not teach a seal formed on a coating selected from anodic coatings, phosphating coatings, or black oxide coatings where the “anodic coatings, phosphating coatings, or black oxide coatings comprise a compound selected from oxides, hydroxides, phosphates, carbonates, oxalates, silicates, aluminates, borates, polymers, or combinations thereof,” as claimed. No citation to Tadokoro is provided, and Applicants respectfully request clarification. Applicants note that the reference to phosphate at col. 5, lines 27-31 refers to the fact that the rare earth metal complex can have an inorganic compound as a ligand, as discussed above. This is not a teaching of a phosphate coating on the metal.

With respect to claims 7-8, the examiner stated that “Tadokoro teaches vanadate anion and cerium forming an oxyacid compound. Therefore, the vanadium ion reads on the claimed additional ion. Since the oxyacid compound of Tadokoro reads on the claimed rare earth/valence stabilizer, the examiner asserts that the rare earth/valence stabilizer as taught by Tadokoro inherently has a central cavity containing cerium as claimed.” However, claim 8 recites that the “rare earth/valence stabilizer complex has a central cavity containing a cerium, praseodymium, or terbium ion and an additional ion.” The vanadium ion in a cerium/vanadate complex is not an additional ion in the central cavity as claimed. As discussed on p. 167, line 30 to p. 168, line 20, the central cavity of the heteropolymetallates can contain an ion in addition to cerium. Examples include silicomolybdates, phosphomolybdates, silicotungstates, and phosphotungstates. In these complexes, the central cavity contains a  $Si^{+4}$  or  $P^{+5}$  ion in addition to the cerium ion. The molybdenum or tungsten is not in the central cavity; rather, it forms the central cavity. Thus, with a cerium/vanadate complex as described in Tadokoro, the vanadium is not in the central cavity, as claimed.

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With respect to claims 35-38, the examiner stated that “Tadokoro teaches the presence of cerium ions which read on the claimed cationic solubility control agent. Tadokoro further teaches the presence of calcium, zinc, lanthanum, hydrogen, zirconium, and titanium ions (col. 10, lines 9-18) which also read on the claimed cationic solubility control agent.”

Tadokoro does not teach the use of solubility control agents as claimed. As discussed at p. 340, line 29 to p. 341, line 24, one of the roles of the valence stabilizer is to allow for formation of a tetravalent cerium, praseodymium, or terbium complex that has a specific solubility range. The anions or cations present in the coating solution may be sufficient to form a  $\text{Ce}^{+4}$ ,  $\text{Pr}^{+4}$ , or  $\text{Tb}^{+4}$ -containing compound within the conversion coating that exhibits the desired solubility characteristics. Additional solubility control may be desirable to optimize the performance of the tetravalent cerium-, praseodymium-, or terbium-valence stabilizer complex. The initial formation of the conversion coating may produce  $\text{Ce}^{+4}$ ,  $\text{Pr}^{+4}$ , or  $\text{Tb}^{+4}$  compounds with solubilities greater than optimal. Additional solubility control agents applied to a workpiece can enhance the  $\text{Ce}^{+4}$ ,  $\text{Pr}^{+4}$ , or  $\text{Tb}^{+4}$  content of the coating by forming more insoluble compounds in place. Additional solubility control agents are typically applied as a second solution.

Tadokoro teaches that the layer and the treatment solution can include some additional materials.

There may also be added to the layer and treatment solution of the invention phosphoric acid or polyphosphoric acid as *passivation layer-forming aids*, or calcium hydroxide, calcium carbonate, calcium oxide, zinc phosphate, potassium phosphate, calcium phosphate, lanthanum phosphate, lanthanum hydrogen phosphate, cerium phosphate, cerium hydrogen phosphate, calcium silicate, zirconium silicate, aluminum phosphate, zirconium phosphate,  $\text{TiO}_2$ ,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{La}_2\text{O}_3$ ,  $\text{CeO}_2$ , etc. as *additional additives*.

Col. 10, lines 10-18. Tadokoro teaches the use of certain compounds as passivation layer-forming aids, and others as additional additives in its layer. Tadokoro's compounds are not

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solubility control agents. They do not alter the solubility of the cerium-, praseodymium-, or terbium-valence stabilizer complex. They are simply additional components in the layer.

With respect to claims 51-53, and 55, the examiner stated that "Tadokoro further teaches the addition of phosphoric acid in the coating composition (col. 7, lines 45-55). Therefore, the phosphoric acid as taught in by Tadokoro reads on the claimed nonionic surfactant as a wetting agent and the claimed agent which prevents smudging." Applicants note that claims 51-53, and 55 depend indirectly from claim 44, which was not rejected as being anticipated by Tadokoro. In any event, col. 7, lines 45-55 discusses various materials which can be used as the matrix.

Therefore, claims 1, 4-11, 35-38, 51-53, 55, and 137 are not anticipated by Tadokoro.

The rejection of claims 1, 4-11, 35-38, 44-46, and 137 under 33 U.S.C. § 102(b) as being anticipated by DePue (U.S. Patent No. 5,322,560) has been overcome. DePue teaches a corrosion inhibitor compound for treating aluminum flake pigment. The corrosion inhibitor compound is the reaction product of a water-soluble metal salt including metals selected from the group consisting of yttrium and rare earth metals and an anionic metal salt including transition metal oxo-complexes and soluble salts of silicon and mixtures thereof. Abstract.

According to the examiner, DePue teaches that the "corrosion inhibitor compound comprises a rare earth metal such as tetravalent cerium (col. 2 lines 55-60), a silicon salt and a metal oxo-complexes [sic] of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, and W (col. 2 lines 27-36, col. 3 lines 17-22)." The corrosion inhibitor of DePue is described at col. 2, lines 27-36, and col. 3, lines 17-22. However, the compounds described at col. 2, lines 55-59 are different compounds (water-soluble) which can be used as primary corrosion inhibitors in combination with DePue's claimed corrosion inhibitor (slightly soluble) which would be a secondary corrosion inhibitor.

*The corrosion inhibitors of the present invention are also useful when used in combination with water-soluble metal salts of yttrium and the rare earth metals.*

*Particularly useful salts include trivalent cerium, yttrium and lanthanum salts and tetravalent cerium salts.*

These salts are discussed further at col. 4, lines 34-55.

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The slightly soluble corrosion inhibitor of the present invention is also useful in aqueous coating compositions containing aluminum flake pigment. The corrosion inhibitor is particularly effective in coating compositions when used as a secondary corrosion inhibitor in combination with *a primary corrosion inhibitor which is a water-soluble salt of trivalent or tetravalent salt of cerium, yttrium or lanthanum*. Water-soluble salts useful as a primary corrosion inhibitor compound for treating the aluminum pigment include cerium sulfate, cerium triacetate, cerium isopropoxide, ammonium cerium nitrate, yttrium triacetate, lanthanum triacetate and cerium nitrate.

When used in combination in a coating composition, *the water soluble metal salt used as the primary corrosion inhibitor* is present in an amount of between 0.01% and 5.0% by weight based on total pigment weight and *the slightly soluble salt used as the secondary corrosion inhibitor* is used in an amount between 0.01% and 5.0% by weight based on the combined weight of the corrosion inhibitor and pigment.

Thus, the only tetravalent rare earth compounds described in DePue are *salts*, not *rare earth/valence stabilizer complexes*, as claimed. The salts are highly soluble in water, and fall above the solubility parameters specified in the claims. In fact, several of the salts mentioned are identified in the application as being suitable cerium sources: cerium sulfate, cerium triacetate, ammonium cerium nitrate and cerium nitrate. See p. 349, line 21 to p. 350, line 8, and Table 4.

In addition, DePue's corrosion inhibitor is not a seal, as claimed. DePue's corrosion inhibitor compounds inhibit corrosion in aluminum flake pigment particles in a basic aqueous environment. Aluminum flake pigment treated with the corrosion inhibitor compound inhibits corrosion of the pigment particles in water-borne coating compositions. See col. 1, lines 54-66, and col. 2, lines 8-12.

The corrosion inhibitors are formed by reacting the water-soluble metal salt of yttrium, or rare earth metals with a transition metal oxo-complex or a silicate salt in aqueous solution. The resultant reaction product is then filtered and oven dried. See col. 3, lines 23-29. The aluminum flake pigment particles are treated with the corrosion inhibitor by forming a slurry of the

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aluminum pigment and a corrosion inhibitor and water. The pigment remains in mixture with the solution for 0.5 to 4 hrs to form the protective coating of the corrosion inhibitor on the aluminum flake pigment. The contact time must be adequate for formation of a rare earth metal or transition metal oxide coating on the aluminum flake pigment. See col. 2, lines 37-45, and col. 3, lines 35-62, and Examples.

Most of the time, the corrosion inhibitor is unreacted in the form of a precipitate due to its relatively insoluble nature. It provides an additional source of rare earth metal to form a metal oxide protective coating at any site left unprotected by the metal oxide film provided by the more soluble trivalent and tetravalent salts of the primary corrosion inhibitor. Col. 4, line 56 to col. 5, line 9.

As discussed above, metals and metal alloys with anodized coatings, phosphate coatings, or black oxide coatings have seals applied to fill the pores in the coating and deposit compounds that will act as long-term corrosion protective species. See p. 2, lines 12-29. In DePue, when a site becomes unprotected by the metal oxide film provided by the more soluble trivalent and tetravalent salts of cerium, yttrium and lanthanum, the corrosion inhibitor precipitate acts as a source of rare earth, yttrium, or transition metal to form a metal oxide protective coating on the pigment. Col. 4, line 56 to col. 5, line 9. Thus, DePue's corrosion inhibitors are not seals, as claimed.

With respect to claim 6, the examiner stated that "DePue teaches the presence of metal oxo-complexes (i.e. oxides). DePue further teaches polymer solvents for the corrosion inhibiting compound (col. 3, lines 35-43). Therefore, DuPue teaches the claimed oxide compound and the claimed polymer as recited in instant claim 6." However, DePue does not teach a seal formed on a coating selected from anodic coatings, phosphating coatings, or black oxide coatings where the "anodic coatings, phosphating coatings, or black oxide coatings comprise a compound selected from oxides, hydroxides, phosphates, carbonates, oxalates, silicates, aluminates, borates, polymers, or combinations thereof," as claimed.

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With respect to claims 7-8, the examiner stated that "since DePue teaches the claimed rare earth/valence stabilizer complex, it also inherently teaches the central cavity containing cerium as recited in instant claim 7. In addition, the metal oxo-complexes (i.e. valence stabilizer) as taught by DePue contains Ti, Zr, V, Cr ions, which read on the claimed additional ions as recited in instant claims 7-8." However, as discussed above, the central cavity of the heteropolymetallates can contain an ion in addition to cerium. Examples include silicomolybdates, phosphomolybdates, silicotungstates, and phosphotungstates. In these complexes, the central cavity contains a  $\text{Si}^{+4}$  or  $\text{P}^{+5}$  ion in addition to the cerium ion. The molybdenum or tungsten is not in the central cavity; rather, it forms the central cavity. Claim 9 recites that the "rare earth/valence stabilizer complex has a central cavity containing a cerium, praseodymium, or terbium ion and an additional ion." The Ti, Zr, V, and Cr ions in the metal oxo-complexes are not additional ions in the central cavity as claimed.

With respect to claims 35-38, DePue does not teach the use of solubility control agents as claimed. As discussed above, one of the roles of the valence stabilizer is to allow for formation of a tetravalent cerium, praseodymium, or terbium complex that has a specific solubility range. The anions or cations present in the coating solution may be sufficient to form a  $\text{Ce}^{+4}$ ,  $\text{Pr}^{+4}$ , or  $\text{Tb}^{+4}$ -containing compound within the conversion coating that exhibits the desired solubility characteristics. Additional solubility control may be desirable to optimize the performance of the tetravalent cerium-, praseodymium-, or terbium-valence stabilizer complex. The initial formation of the conversion coating may produce  $\text{Ce}^{+4}$ ,  $\text{Pr}^{+4}$ , or  $\text{Tb}^{+4}$  compounds with solubilities greater than optimal. Additional solubility control agents applied to a workpiece can enhance the  $\text{Ce}^{+4}$ ,  $\text{Pr}^{+4}$ , or  $\text{Tb}^{+4}$  content of the coating by forming more insoluble compounds in place. Additional solubility control agents are typically applied as a second solution.

The examiner stated that "[i]n addition, the Ce, Ti, Zr, V, Cr, W, Mo, Nb, Hf, Ta as taught by DePue also read on the claimed cationic solubility control agent." Because the examiner has not provided a citation to DePue, Applicants are unable to determine what this

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statement refers to. Applicants did not find all of these elements listed together anywhere in DePue. Therefore, Applicants respectfully request clarification.

With respect to claims 45-46, the Examiner cited col. 6, lines 12-28 as showing “a color brightener . . . which read [sic] on the agent for improving color fastness.” However, DePue does not teach a color brightener.

It may be desirable to include small amounts of *rheology control agents*, for example fumed silicas, hectorite clays, bentonite clays, or cellulosics like cellulose acetate butyrate. Such materials are usually used at levels of less than 10% based on the total solid weight of reactants. *Rheology control agents are used to control the flow and leveling of the composition during application and curing steps. The rheology control agent is also for controlling the metallic appearance of the coating.* Such materials *may help “fix” the pigment flake surface in an alignment parallel to the surface of the coating to maximize the brightness when viewed head-on and to maximize the darkness when viewed obliquely.*

DePue teaches the use of rheology control agents which control the flow of the material during application and curing. They can also help to align the aluminum pigment flake surface parallel to the surface of the coating. However, this alignment does not improve color-fastness of the coating. Thus, DePue does not teach “an agent which improves color-fastness of the conversion coating,” as claimed.

Therefore, claims 1, 4-11, 35-38, 44-46, and 137 are not anticipated by DePue.

The rejection of claims 2-3, and 54 under 33 U.S.C. § 103(a) as being unpatentable over Tadokoro is respectfully traversed. Tadokoro does not teach or suggest the limitations of claim 1, as discussed above. In addition, claim 54 indirectly depends from claim 44, which was not rejected as obvious over Tadokoro. Therefore, claims 2-3, and 54 would not have been obvious to one of skill in the art at the time the invention was made over Tadokoro.

The rejection of claims 41-42 under 33 U.S.C. § 103(a) as being unpatentable over Tadokoro in view of Eddinger (U.S. Patent No. 6,074,464) is respectfully traversed. Eddinger is

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cited as teaching "the addition of lubricant such as graphite into the phosphate conversion coating." However, Eddinger does not remedy the deficiencies of Tadokoro. Therefore, claims 41-42 would not have been obvious to one of skill in the art at the time the invention was made over Tadokoro in view of Eddinger.

The rejection of claim 43 under 33 U.S.C. § 103(a) as being unpatentable over Tadokoro in view of Eddinger and further in view of Gulley (U.S. Patent No. 5,330,588) is respectfully traversed. Gulley is cited as teaching "the use of silver in a chemisorption layer on a metal part as a lubricant in order to averts [sic] high frictional forces." However, Gulley does not remedy the deficiencies of Tadokoro, or Tadokoro combined with Eddinger. Therefore, claim 43 would not have been obvious to one of skill in the art at the time the invention was made over Tadokoro in view of Eddinger and further in view of Gulley.

The rejection of claims 44-47 under 33 U.S.C. § 103(a) as being unpatentable over Tadokoro in view of Dattilo (U.S. Patent No. 6,291,018) is respectfully traversed. Dattilo is cited as teaching "a metal surface treatment coating composition comprising color pigments such as carbon black and phthalocyanines." However, Dattilo does not remedy the deficiencies of Tadokoro. Therefore, claims 44-47 would not have been obvious to one of skill in the art at the time the invention was made over Tadokoro in view of Dattilo.

The rejection of claims 2-3 under 33 U.S.C. § 103(a) as being unpatentable over DePue is respectfully traversed. DePue does not teach or suggest the limitations of claim 1, as discussed above. Therefore, claims 2-3 would not have been obvious to one of skill in the art at the time the invention was made over DePue.

The rejection of claims 41-42 under 33 U.S.C. § 103(a) as being unpatentable over DePue in view of Eddinger (U.S. Patent No. 6,074,464) is respectfully traversed. Eddinger is cited as teaching "the addition of lubricant such as graphite into the phosphate conversion coating." However, Eddinger does not remedy the deficiencies of DePue. Therefore, claims 41-42 would not have been obvious to one of skill in the art at the time the invention was made over DePue in view of Eddinger.

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The rejection of claim 43 under 33 U.S.C. § 103(a) as being unpatentable over DePue in view of Eddinger and further in view of Gulley (U.S. Patent No. 5,330,588) is respectfully traversed. Gulley is cited as teaching “the use of silver in a chemisorption layer on a metal part as a lubricant in order to averts [sic] high frictional forces.” However, Gulley does not remedy the deficiencies of DePue, or DePue combined with Eddinger. Therefore, claim 43 would not have been obvious to one of skill in the art at the time the invention was made over DePue in view of Eddinger and further in view of Gulley.

The rejection of claim 47 under 33 U.S.C. § 103(a) as being unpatentable over DePue in view of Dattilo (U.S. Patent No. 6,291,018) is respectfully traversed. Dattilo is cited as teaching “a metal surface treatment coating composition comprising color pigments such as carbon black and phthalocyanines.” However, Dattilo does not remedy the deficiencies of DePue. Therefore, claim 47 would not have been obvious to one of skill in the art at the time the invention was made over DePue in view of Dattilo.

The rejection of claims 1-11, 35-38, 41-47, 51-55, and 137 under the judicially created doctrine of obviousness-type double patenting over claims 1-13, 37-40, 43-46, and 163 of copending Application Serial No. 10/625,915 has been overcome by the filing of a terminal disclaimer.

The rejection of claims 1-11, 35-38, 41-47, 51-55, and 137 under the judicially created doctrine of obviousness-type double patenting over claims 1-5, 8-12, 36-39, 43-45, and 102 of copending Application Serial No. 10/625,885 has been overcome by the filing of a terminal disclaimer.

**CONCLUSION**

Applicants respectfully submit that, in view of the above amendment and remarks, the application is now in condition for allowance. Applicants respectfully request that claims 1-11, 35-38, 41-47, 51-55, and 137 be passed to allowance.

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If the Examiner has any questions or comments regarding the present application, he is invited to contact the undersigned attorney at the telephone number indicated below.

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